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THE STUDY OF LANGUAGE ACQUISITION

Robin Campbell and Roger Wales

(from J. Lyons (ed.) *New Horizons in Linguistics*. Penguin Books. 1970. Chapter 13)

By the acquisition of language is meant the process whereby children achieve a fluent control of their native language. The term 'acquisition' is used rather than 'learning', because 'learning' tends to be employed by psychologists in a more specific sense than is perhaps appropriate. It is a matter of controversy whether the acquisition of language can be accounted for within current versions of psychological theories of 'learning'.

The study of language acquisition has been strongly influenced by the theory of generative grammar. Chomsky (1968) has argued that the speed with which children are able to infer the grammatical rules underlying the speech they hear about them, and then to use these rules for the construction of utterances they have never heard before, suggests that children are born with a knowledge of the (allegedly universal) formal principles which determine the grammatical structure of the language. This is the 'rationalist' hypothesis (the hypothesis of 'innate ideas'), as opposed to the 'empiricist' hypothesis, which, in its strongest form, says that all knowledge comes from experience.

Chomsky's restatement of the doctrine of innate ideas has provoked a lot of discussion among psychologists, philosophers and linguists; and it is criticized in this chapter by Campbell and Wales. They argue, as others have done, that Chomsky and many of the psychologists influenced by him have failed to give sufficient attention to the environmental factors involved in the development of what they call 'communicative competence'. See also Hymes (1970).

I have already referred to this notion of 'communicative competence in my introduction to the chapter by Halliday (p. 140; see also p. 287). The present chapter also contains much that is relevant to Kiparsky's discussion of the role of language acquisition in language change (pp. 310ff).

1. THE first attempt we know of to record the linguistic development of a child was that of the German biologist Tiedemann (1787); and his interest was in initiating the collection of normative data on the development of children. The greatest stimulus to the serious and careful study of the acquisition of language by children stems from Darwin's theory of evolution, which suggested the continuity of man with other animals. Darwin himself contributed a pioneer study (1877), as did Taine (1877). But it was in the superb, detailed study of the German physiologist Preyer (1882), who made detailed daily notes throughout the first three years of his son's development, that the study of child language found its true founding father. With Sully (1895) and Shinn (1893) following closely on Preyer, a substantial tradition of careful descriptive work was established, easily traceable from the early decades of this century in the journal Pedagogical Seminary, through the massive work of the Sterns (1924, 1928) and Leopold (1939–49), up to the exciting recent attempts to refine the descriptive process by appropriating the tools developed by the generative grammarians (e.g. Brown & Frazer, 1963). This tradition was largely unaffected by the behaviourist movement in psychology.

It seems appropriate to begin this chapter by referring to the historical origins of the study, because there is currently a tendency to forget that the scientific study of child language has an important and thoroughly respectable heritage of observation and theoretical discussion. Recognition of the existence of this tradition and its influence may not only save us from the mere reworking of old questions but may also lead us to adopt a more moderate and informed position with respect to a number

of contemporary claims and controversies. For example, the contemporary practice of vilifying behaviourism for its misleading and inept attempts to explain language acquisition seems largely irrelevant. The important issue is how to go beyond the achievements of Leopold and the Stems, scholars who owed nothing to behaviourism.

Let us therefore allow Sully to describe the kinds of questions and issues which continue to determine the range and nature of our interest in child language:

> To the evolutionary biologist the child exhibits man in his kinship to the lower sentient world. This same evolutionary point of view enables the psychologist to connect the unfolding of an infant's mind with something which has gone before, with the mental history of the race (1895: 8). If, reflects the psychologist, he can only get at this baby's consciousness so as to understand what is passing there, he will be in an infinitely better position to find his way through the intricacies of the adult consciousness. It may be, as we shall see by and by, that the baby's mind is not so perfectly simple, so absolutely primitive as it at first looks (1875:7). In this genetic tracing back of the complexities of man's mental life to their primitive elements in the child's consciousness, questions of peculiar interest arise. A problem, which though having a venerable antiquity is still full of meaning, concerns the precise relation of the higher forms of intelligence and of sentiment to the elementary facts of the individual's life experience. Are we to regard all our ideas as woven by the mind out of its experiences, as Locke thought, or have we certain 'innate ideas' from the first. Locke thought he could settle this point by observing children. Today when the philosophic interest is laid not on the date of the appearance of the innate intuition, but on its originality and spontaneity, this method of interrogating the child's mind may seem less promising. Yet if of less philosophical importance than was once supposed, it is of great psychological importance (1895:768). The awakening of this keen and varied interest in childhood has led, and is destined to lead still more, to the observation of infantile ways. Pretty anecdotes of children which tickle the emotions may or may not add to our insight into the peculiar mechanism of children's minds (1895:10). The observation which is to further understanding, which is to be acceptable to science, must be scientific. That is to say, it must beat once guided by foreknowledge, specially directed to what is essential in a phenomenon and its surroundings or conditions, and perfectly exact. If anybody supposes this to be easy, he should first try his hand at the work, and then compare what he has seen with what Darwin or Preyer has been able to discover (1895:11).

Thus from the first the study of language acquisition was set in the context of the investigation of the child's total development. Further, the original interest arose out of serious questions about the nature of man and his behaviour: there was more at stake than mere description. Nevertheless, priority was given to the careful description of what the child was doing. This was followed by attempts to elucidate what sort of thing language acquisition was, and only then by speculation about the explanations of these phenomena. We will now use these aims as a platform from which to discuss contemporary issues.

In the pursuit of these aims Leopold (1949) and those before him took the communicative act as their basic psychological unit. Description was a matter of accurately recording not only the form of a child's utterances, but also the context in which they were made and the meanings (so far as they could be determined) of the constituent 'words'. Perhaps because of this, but more probably because they did not have such clear ideas about syntax as we have today, these early workers tended to terminate their accounts at about the beginning of the third year of the child's life, by which time most children have begun to produce utterances of two or three distinct words.

The principal focus of more recent research, however, has been the period stretching from the beginning of such syntactically structured speech. This reorientation is due almost completely to Chomsky's work in syntactic theory (see pp. 23-8). The main aim of this chapter will be to argue that an extremely important guiding principle of the early work has been sacrificed in this reorientation and to suggest some ways in which it might be restored to its former methodological

prominence. Limited space prevents us from giving a detailed review of empirical work on language acquisition, but many excellent reviews are available elsewhere: cf. Richter (1927), Leopold (1948), McNeill (1966, 1969), Ervin-Tripp (1966). Details of much recent work can also be found in the following collections of articles: Bellugi & Brown (1964), Smith & Miller (1966), Slobin (1970), Reed (1970), Hayes (1970).

Contrary to what one might expect, our knowledge of language acquisition has not been greatly advanced by the recent spate of empirical work. Furthermore, it is our belief that no real theoretical understanding of the acquisition of syntax will be obtained unless, paradoxical as this may seem, the methodological distinction between competence and performance drawn by Chomsky (the man who, more than any other, has shown the shallowness, indeed the irrelevance of almost all behaviourist accounts of language acquisition) is drastically revised. We will now indicate how and why we think this distinction should be revised.

2. In the first half of Fodor and Garrett (1966) there is an excellent discussion of the distinction between competence and performance, in the course of which the authors distinguish one clear sense of the distinction which they, like us, regard as 'eminently honourable'. This is the sense in which competence in any sphere is identified with capacity or ability, as opposed to actual performance, which may only imperfectly reflect underlying capacity. This sense of the distinction has been honoured by psychologists in the past (e.g. Lashley, Hull, and many psychologists concerned with education) and likewise by certain social psychologists concerned with the study of attitude and opinion, etc. (e.g. Lazarsfeld). It applies in the construction of so-called 'performance' models of language users; that is to say, 'performance' models are in fact models of competence (in this weak sense of competence). However, when Chomsky talks of competence he is usually referring to a far 'stronger' notion, although it is not clear exactly what is meant by this stronger notion. We shall try to clarify the stronger notion in what follows.

The diverse capacities of human beings are subject to a variety of limitations, and some of these limitations may be described as 'non-essential'. For instance, our arithmetical capacity is limited by the amount of information we can store and manipulate at any one time; our capacity to walk is limited by the amount of time we can go without food or rest. In both these cases, the limiting factors are very general, applying, in the case of the former, to all mental activities and, in the case of the latter, to all physical activities. Hence we may, if we so choose, omit these limiting factors from our theoretical account of arithmetical or locomotive abilities: they are non-essential (i.e. non-specific) to these abilities. Similarly, by omitting any account of the role of memory or the various low-level sensori-motor capacities involved in the perception and production of speech, we can considerably simplify our characterization of linguistic abilities, and thereby arrive at the stronger notion of linguistic competence.

We have distinguished two senses of the term 'linguistic competence', the 'weaker' and the 'stronger'. We shall refer to these as competence-1 and competence-2 respectively. So far our discussion has been relatively uncontroversial, and it would be generally agreed that the clarification of the notion of 'competence' has far-reaching consequences for the psychological investigation of language and for the study of language acquisition in particular (cf. Moravcsik, 1967, 1969). But we must now distinguish a third sense of 'competence'.

Although generative grammarians, in particular Chomsky, claim that their work is an attempt to characterize the nature of competence-2 (that is, the nature of those human abilities that are specific to language), their main effort has in fact been directed towards a more restricted sort of competence, which we will call competence-3, from which by far the most important linguistic ability has been omitted – the ability to produce or understand utterances which are not so much grammatical but, more important, appropriate to the context in which they are made (on this point, the crux of this chapter, see also Schlesinger, 1969). By 'context' we mean both the situational and the verbal context of utterances. It is interesting to note that in at least one place Chomsky allows that part of this ability belongs properly to linguistic competence: 'an essential property of language is that it provides the means for . . . reacting appropriately in an indefinite range of new situations' (1965:6). In passing, it is also worth remarking that the gloomy, negativistic and questionable conclusions of Fodor and Garrett (1966) on the nature of the relationship between grammar and 'performance' models lose their relevance once it is realized how crucial this notion of contextual appropriateness is to the use of language, since neither the type of grammar motivating the empirical studies they discuss, nor the studies themselves, incorporate contextual information.

Of those linguistic abilities explicitly accounted for by recent transformational work, it is the ability to produce and understand indefinitely many novel sentences that has received the greatest attention (see p. 12 above). Chomsk frequently refers to this ability and for him at least it is this productivity and creativity implicit in the normal use of language that most needs explaining. Chomsky's many remarks on this point are well grounded, and he has quite properly criticized twentieth-century 'structural' linguistics and behaviourist psychology for ignoring this important aspect of language use. But one can go too far in the opposite direction. Much of what we say and write is constrained, in important ways, by the particular circumstances in which we are speaking or writing. Recent work on language acquisition and use has tended to neglect this fact.

Before continuing, we should emphasize that it is not our intention to question the productivity or creativity of language use: what we are insisting upon is the limited nature of the productivity to be explained. Nor do we wish to take issue with the validity of choosing, as a methodological decision, to limit the study of language to the level of context-less sentences. It should be recognized, however, that although a limitation of this kind may serve linguistic ends, its inevitable effect upon the psychology of language is as stultifying as that of the muchabused behaviourist approaches. The history of psychology shows that there is a very great danger of leaping from one extreme position to another when in fact the correct view of the phenomena lies somewhere in between. (A good recent example might be the incremental v. all-or-none learning controversy: cf. Simon, 1968.) We are therefore arguing that an adequate psychology of language must take account not only of the creative aspects of language use but also of the important role played by contextual factors.

At this point it is worth while referring to a related issue which has been grossly oversimplified in recent psycholinguistic literature. It is only too easy to infer from a casual reading of Chomsky's devastating review (1959) of Skinner or Bever, Fodor and Weksel's (1965) critique of Braine that not only have traditional learning theories very little to say on the subject of language acquisition, but also that no learning is involved at all in the process of acquiring a language and that everything is accounted

for by innate predispositions. We are beyond doubt innately predisposed to 'structure information' in certain ways. As Chomsky (1965) has pointed out, even the most militant brand of empiricism presupposes some sort of innate determination. However, it is equally certain that every behavioural acquisition depends to some extent on the interaction of these predispositions with the environment. It is a matter of methodological emphasis whether one directs attention to the environmental variables or to the predispositions. However, it seems clear to us (and to this extent we are in line with traditional approaches) that it is the environmental variables that should be made the primary object of study, since they are more accessible to investigation.

There are considerable parallels between the two issues just discussed: in each there is a question of emphasis at stake, not a question of fact. In both cases it is necessary to take account both of the contribution of the individual and the contribution of the context or environment in which he acts or learns.

For the sake of future reference, let us call the two restricted types of language competence referred to above communicative competence (corresponding to competence-2) and grammatical competence (corresponding to competence-3). The rest of this chapter will be devoted to considering how the acquisition of communicative competence can be described and explained. We claim little originality for the view that communicative competence is the primary goal of the psychology of language – in this respect we are the heirs of a long tradition. This theoretical commitment is also in accord with current developments in psychology and linguistics. It can be related, for example, to the numerous recent attempts to enlarge the notion of 'grammaticality' by taking into account such contextual matters as relations between speaker and hearer (e.g. Fillmore, 1966; Boyd & Thorne, 1969) and referential relationships (e.g. Postal, 1968; Dik, 1968). It can also be related to the current tendency for linguists to describe the deepest levels of grammatical structure in semantic terms (cf. Chafe, 1967, 1968; Anderson, 1968; McCawley, 1969). Clearly, semantically based transformational grammars hold out greater promise for the characterization of communicative competence than do grammars of the type discussed in Chomsky (1965). From these very general considerations, we turn now to more specific issues. We will begin by considering how the preceding suggestions might affect the way in which communicative competence is studied from a developmental point of view. We will then deal with the controversial issue of explaining its acquisition.

3. Many recent descriptions of syntactic development, notably that of Roger Brown and his associates (e.g. Brown & Fraser, 1963; Klima & Bellugi, 1966) have failed to take account of situational variables and freely admit this as a defect. Even if one's goals are limited to describing the range of grammatical structures that a child is capable of producing at a particular stage of development, there is still no escape from the necessity of specifying contexts. We can see this in the following way. Let us suppose that during a particular period of development a child is never observed to produce any passive sentences. Suppose further that certain contextual considerations are satisfied whenever such sentences are produced by adults (not an implausible suggestion: for a discussion of some of the factors relevant to the choice of the passive in English see Svartvik, 1966). Then the absence of passive sentences from our sample of the child's language at this stage may be attributable either to a lack of capacity to produce this particular structure or to the absence of occasions for its

production. Without the relevant contextual information, there is clearly no possibility of deciding between these two alternatives. Some support for this observation is provided by an unpublished analysis of comparative expressions in the speech of a group of pre-school children aged three-and-a-half to four. The corpus consisted of daily observations in the experimental nursery of the Edinburgh S.S.R.C. Cognition Project over a period of six months. From this analysis (collated by Julian Dakin) it is clear that comparative expressions occur much more frequently in 'comparative' situations where two or more children are vying with each other in various tasks – for example in threading strings of beads, building sandcastles, etc. Clearly, the language of a single child at home is less likely to show such structures.

The approach we are recommending would therefore involve sampling not only as much speech as possible but also as diverse a range of situations as possible, some sort of situational record being made at the same time as the speech record. The obvious alternative to this would be to construct different situations experimentally rather than simply wait for them to develop 'naturally'. Here we come up against serious problems. We cannot decide in advance what contexts are most likely to provide suitable occasions for the utterance of a particular structure. We can however, study children's comprehension in various situations and note whether it approximates to adult comprehension in all of these; and, to the extent that it does, we can then try out eliciting contexts which work with adults with the hope that they will be close to the appropriate eliciting context for children.

At Edinburgh, we have made a detailed study of comparative expressions in pre-school children following roughly these lines. Unfortunately, the finding quoted above came too late to be used experimentally in an 'eliciting' context. In one study the eliciting context was a series of cardboard soldiers of increasing or decreasing stature. The child was first presented with two soldiers and asked to tell the experimenter about them. Questioning followed until some mention was made (or, failing that, provided by the experimenter) of their different sizes. On addition of each subsequent soldier to the series the child was asked 'And what about him?' This technique produced a full range of adjectival forms – so-called positives or absolutes (He's big, He's a big soldier, etc.), full comparatives (He's bigger than him, etc.), superlatives (He's the biggest soldier, etc.) as well as several 'functional' comparisons (He's too big, He's wee enough, etc.) which would not have been appropriate adult utterances. In another study the eliciting context involved the justification of a choice of one from a set of depicted objects varying in size for a particular purpose. Here the range of expressions was more restricted: most of them included superlatives, but 'functional' comparisons and so-called absolute adjectives were also found. Notably, almost no full comparatives were found. We say 'so-called' absolute adjectives, since another study of comprehension of expressions containing absolute adjectives (conducted with Robert Grieve) has shown convincingly that, even at the age of three or so, children interpret such constructions comparatively. The details of these various studies are not relevant here (cf. Donaldson & Wales, 1970; Wales & Campbell, 1970; Wales, 1970). These results have been mentioned merely to illustrate the effects of varying the 'eliciting' context. So far as we know, studies of this type have not been conducted in the past.

There are two kinds of investigation which we would wish to distinguish from our own. Firstly, a few recent studies (e.g. Frazer, Bellugi & Brown, 1963) have tested children's production and comprehension of grammatical contrasts like singular v. plural, past v. present, etc. Strictly speaking, this technique does not measure

production at all, since the child has merely to choose between two proffered oral descriptions of a picture: he does not have to describe it himself. Nor does this technique test comprehension satisfactorily, since the child has to choose between only two alternative 'depictions' of each expression. Our approach, by contrast, has been to take a particular structure, and to vary both its lexical content and the context in which it is to be comprehended.

The second group of studies we wish to refer to and compare with our own are those associated with the name of Piaget. It is often said that many studies of children's thinking in the tradition of Piaget could be reinterpreted as studies of their linguistic comprehension. While we subscribe to this general view, we would point out that one could in principle distinguish such studies in terms of the differing demands they make on cognitive and linguistic capacity. In those studies traditionally regarded as testing cognitive capacity it is assumed (possibly quite often wrongly) that the demands made upon linguistic capacity are correspondingly slight. At any rate, we are very much aware of this difficulty and for that reason we have endeavoured to make our tasks as simple as possible. Using this method with pre-school groups, we have discovered many facts which appear surprising in a Piagetian framework. For instance, expressions containing 'more' are understood in the same way as the corresponding expressions containing 'less'. For example, children confronted with two model trees on which model apples can be hooked tend to respond in the same way to the instruction 'Make it so that there are less apples on this tree than on this one', as they do to 'Make it so that there are more apples on this tree than on this one' (cf. Donaldson & Balfour, 1968). In a classification task we have also observed that expressions containing *the same . . . as* are interpreted in the same way as the corresponding expressions containing *different . . . from*.

By defining communicative competence (competence-2) as only those human abilities that are specific to language, we have made the assumption that, although it is difficult to distinguish linguistic from cognitive competence, this is an important issue. This follows equally from Chomskyan notions of linguistic competence. The success of formal linguistics certainly buttresses the assumption that linguistic capacity is theoretically separable from other cognitive capacities. The experimental study of children's linguistic comprehension seems to provide an excellent testingbed for this assumption.

4. We turn now to the problem of explaining the acquisition of communicative competence. As will be clear from the preceding sections, we believe that much more attention must be paid to the linguistic environment (construed here as the communicative environment) of the developing child than has been given in the recent past, without however reverting to arid stimulus-response formulations (e.g. of behaviourist explanations). Although some studies of phonological aspects of the communicative environment and their relationship to the child's phonology have been reported (cf. Eunice Pike's, 1949, study of intonation contours), very few studies of syntactic or semantic aspects have been made (we shall refer to them below). Among the questions that might be investigated are the following: (a) Is there a tendency among parents to simplify their speech when addressing children? And, if so, what form does this simplification take? (b) How do parents react to non-comprehension or mis-comprehension and how do they modify their subsequent questions or constructions? (c) What sources of information are available to the developing child about the well-formedness and appropriateness of his utterances or the accuracy of his

comprehension? (d) How often does this or that construction occur in the speech of parents? (e) In what contexts are these constructions used? (f) To what extent do parents correct, repeat, expand or elaborate the speech of children and what form does their intervention take? Clearly, one could go on asking questions of this type indefinitely.

In some cases we have partial answers, in others the answer has been assumed. For instance, in a brilliant paper, Brown used as his starting point such assumptions about the use of everyday common nouns in concrete situations as the following (1958:15): 'the frequencies to which we are now appealing have not, of course, been recorded. We are explaining imagined preferences in names by imagined frequencies of names.' As an example, he suggests that 'when pineapples are being named, the word 'pineapple' is more frequent than the word 'fruit'. On the other hand, Bresson (1963) has argued that the early learning of what such nouns refer to cannot be satisfactorily explained by appealing to the situational pairing of these nouns with their referents, since such words are rarely used in the presence of the object they refer to: one tends instead to point to the object or to use a more general term or a pronoun. If either of these apparently contradictory assumptions is correct, it must impose important constraints on the way in which we learn language; but we cannot know whether either of them is correct until some kind of empirical tests have been carried out.

Almost alone among current students of child syntax, Brown, in his more recent work, has shown a clear awareness of the importance of describing the communicative environment (cf. Brown, 1968; Brown & Hanlon, 1970). He has shown, for example, that, for the families on which he has data (Brown & Hanlon, 1970), approval and disapproval are not primarily linked to the truth value of the proposition which the adult fits to the child's generally incomplete and often deformed sentence. While there are several bases for approval and disapproval they are almost always semantic, or phonological. Explicit approval or disapproval of either syntax or morphology is extremely rare in our records and so seems not to be the force propelling the child from immature to mature forms.

Consider now question (c) above. It has often been suggested in recent psycholinguistic literature that the major source of linguistic information open to the child (the 'primary linguistic data' in the sense of Chomsky, 1965: 25) is the corpus of utterances to which he is 'exposed' and that this set of utterances is meagre and fragmentary. On this assumption, it is quite understandable that so much innate predetermination has been claimed. But we feel that the 'primary linguistic data' is merely one among many such sources of information; and that it may be of relatively minor importance. For instance, Lenneberg (1967) notes that normal children of congenitally deaf parents are very little retarded in their linguistic development (although the speech of their parents is highly abnormal). This might be taken as evidence that there is a considerable innate predetermination; it seems to us to show merely that certain sources of linguistic information have been overvalued.

What then are the other sorts of information? The most salient perhaps is feedback from the child's everyday communicative acts. If his questions, wishes, demands, and so forth are comprehensible and appropriate to the occasion, they will be followed by the desired consequences. There is, however, an important methodological difficulty here: it is no straightforward matter to determine what is a wish, demand or question in the speech of children. As Chomsky (1959) pointed out with respect to Skinner's (1957) analogous notion of *mand*, it is fatuous to attempt to define such

communicative acts in terms of their consequences. We must somehow divine the speaker's intentions.

This point is relevant to another observation made by Brown and Hanlon (1970): that there is apparently no relationship between the well-formedness of children's utterances and comprehension on the part of the parents. In fact, Brown only succeeds in distinguishing comprehension or misunderstanding, on the one hand, from lack of comprehension, on the other. Clearly we need to find ways of distinguishing correct interpretations of the child's utterances from incorrect interpretations. Brown himself seems to regard this difficulty as probably insuperable, since 'any message the investigator can make out, the family can also make out, and so the child will in fact already be communicating any idea we can be sure he has'. That is, where true misunderstanding occurs it is unlikely that we, as investigators, will be able to spot it, since the parent has failed to do so. But the child presumably can. It may well be, therefore, that we should examine all three components of the communicative act: the child's question or demand, the parental response to this and the child's response to the parent's action. Brown implicitly suggests a second possible approach when he remarks that he was only able to identify one instance of genuine misunderstanding in his corpus: Child: What time it is? Parent: Uh-huh, it tells what time it is. In view of his comments quoted above on the difficulty of spotting instances of genuine misunderstanding, it is surprising that Brown fails to see the significance of his identification of this exchange as such an instance. Clearly, it is only because he has succeeded in isolating a class of utterances of the above type as primitive question forms corresponding, in this case, to the well-formed What time is it?, that he has identified this interchange between child and parent as an instance of misunderstanding. It will be clear from this example how complex the study of language acquisition must be, if it is to be conducted in an informative manner.

Despite his largely negative findings (which need to be qualified in the light of the remarks we have just made about misunderstanding), Brown still holds the view that 'the empiricist position has possibilities that have not yet been explored' (1968: 290). He discusses three-termed 'interaction patterns' consisting of a question or demand from the child (or mother), a response by the mother (or child) indicating partial or complete incomprehension, and a complete or partial restatement of the original question or demand by the child (or mother). At Edinburgh we have examined similar data, obtained from transcripts of many experimental sessions with pre-school children. Brown argues that the middle term of the exchange, *Eh?*, *What?*, etc., is understood by the child as a directive to repeat what he has just said. This is not borne out in our data, where the 'repeated' version of the first utterance is normally significantly altered (*cf.* Child: Isn't a torch got a battery not a different as that? Experimenter: Eh? Child: Isn't a battery in a torch not the same as that?) The child is attempting to produce a paraphrase or to correct his syntax or to elaborate in some way on what he previously said. The value of the resulting information (when comprehension is finally secured) is far from clear, since it depends on what the child is attempting. But it does illustrate some interesting possibilities.

Clearly, there are many ways in which a child might learn whether his utterances are well-formed or not (apart from the rather unlikely one of comparing them with stored representations of model utterances to which he has been 'exposed'). The current neglect of environmental factors in favour of 'innate ideas' (cf. Chomsky, 1969) is doubly unfortunate in view of the common tendency to equate linguistic universals with innate predispositions and to overlook the possible contribution of

similarities of environment and upbringing. The proper course to adopt in the investigation of language acquisition is to specify first the nature of the linguistic environment, and thus identify the possible sources of information available to the child about his language, and then to discover, presumably by experimentation, which of these possible sources are used. When that has been done, and not before, it will be time to speculate about the genetic contribution of the individual to language acquisition.

5. In the previous section we limited our discussion of language acquisition to external environmental factors. In this final section, we shall discuss briefly the role of internal factors in the development of the system of language in children. This area of cognitive psychology has been neglected until recently, except in the work of Piaget (cf. Flavell, 1963), who has long urged the necessity of recognizing certain, presumably innate, principles of internal organization ('processes of equilibration', to use his term) in all areas of cognitive development.

Of course, as we have just emphasized, before claiming that a certain change of behaviour is the expression of an endogenous reorganization of some kind, it is methodologically desirable to demonstrate that it is not the result of learning (in the conventional sense). However, there is a certain type of developmental progression frequently observed to occur in young children which effectively guarantees that the development in question is not the result of learning. These are progressions where the child first of all does something 'correctly' and then, with every appearance of systematicity, later proceeds to do it 'wrongly'. Clearly, this development cannot be explained by environmental factors, since there is no adult model for the wrong behaviour. Nor can it be considered simply as one of a series of approximations to the adult model, since the erroneous behaviour is preceded by a stage in which the child behaves correctly. Perhaps the best-known example of such a progression is the over-regularization of the rule for past-tense inflection in English, which has been noted by many of the earlier workers mentioned in section 1 and recently by Ervin (1964). If one examines the child's acquisition of the past-tense forms of the strong verbs in isolation from the rest of the verb system, they can be seen to display this particular developmental sequence. However, although it is in such sequences that the existence of innate principles of organization is most clearly revealed, it seems to us that whenever we find that the child's use of language is (a) systematic (that is, reasonably constant and predictable over a period) and (b) anomalous (that is, strikingly different from the adult usage), we have evidence of the workings of such innate principles. We can see this by asking why the child's communicative competence has developed in this particular way. It cannot be the direct result of external factors, because of the anomalies, so it must be the result of some sort of endogenous systematic change. The particular form of the anomalous usage then tells us something about the character of these endogenous processes.

It is not hard to find the above characteristics. For example, a frequent topic in traditional work on language acquisition was the interplay of extension and restriction of the range of application of the child's earliest words (cf. Sully, 1895; Lewis, 1951; Leopold, 1949: 149). It often happens that a child's usage of a particular word is initially over-extended as compared with adult usage. Each such over-extension, when systematic, tells us something about the way in which the child organizes his experience. The subsequent changes in the application of such words are a potentially rich source of information about organizational principles. The older writers quoted

many cases of endogenous restriction: it was often noted that when a new word, with a range of application overlapping that of a previously acquired word, was learned, the application of the earlier word became restricted, without benefit of instruction or correction. Although this principle works efficiently with incompatible terms, it leads to interesting over-restrictions when one term is a hyponym of the other. (By 'hyponymy' is meant the inclusion of the meaning of one term in the meaning of another: e.g. tulip and rose are hyponyms of flower (*cf.* Lyons, 1968: 453.) Such over-restrictions are clear expressions of endogenous change, since they satisfy our definition of systematic error.

At Edinburgh we have obtained some data on the development of a sub-system of English adjectives, the adjectives used to describe variations of size (i.e. big, tall, fat, etc., and their antonyms). The adjective 'big' stands in a peculiar semantic relationship to the others. Although the relation between each of 'tall', 'fat', 'long', etc. and 'big' is not strictly one of hyponymy it has similar properties, since the range of application of these terms is smaller than that of 'big' and the range of application of 'big' overlaps with each of their ranges. Now we have observed an interesting progression in the application of these adjectives with a number of children (too small, unfortunately, on which to base hard and fast conclusions). Initially, 'big' (or its antonym 'wee') is used with reference to almost all differences of size. As the other more specialized adjectives are learned, however, 'big' may fall out of use or may be restricted to cases of complex differences in size (e.g. to cases where the objects being compared both vary along two or more dimensions).

If our interpretation is correct, a further question arises: suppose that this over-restriction of the range of application of superordinate or quasi-superordinate terms is the result of an innate organizing principle which resolves overlapping ranges in this way, how does the child progress to adult usage? This is a serious problem, since, while over-extension of the range of application leads directly to overt errors, over-restriction does not do so. We have no clear ideas about this and our speculations have already run too far ahead of the facts. However, it is interesting to note that Piaget has often argued that an understanding of class-subclass relationships is a crucial acquisition which marks a fundamental reorganization of the child's thought and occurs usually around seven to eight years of age. Moreover, the type of diagnostic test which he favours for assessing this understanding consists in, for instance, showing the child three tulips and five roses and then asking Are there more roses or more flowers? At lower age-levels children tend to reply that there are more roses. If children typically organize their vocabulary in the way we have suggested, then this result is hardly surprising.

This brings us right back to our remarks in section 3 on the subject of distinguishing linguistic abilities from other cognitive abilities. The generative grammarians have insisted upon the methodological advantages for linguistics of making such a distinction. We have argued that in any study of the acquisition and use of language this distinction needs to be revised in various ways – in ways which give explicit recognition to the communicative function of language. In doing so, we have been attempting to bridge the gap between traditional views of language acquisition and views that are dominant at the present time. We have also tried to relate the psychology of speaking to the psychology of thinking.

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